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13. ABSTRACT (Maximum 200 words)
THIS IS A PROGRESS REPORT ON AEROJET'S STUDIES OF EXPERIMENTS CURRENTLY UNDERWAY (E.G, PLANT GROWTH & DIMP & DCPD LYSIMETER TESTS). TEN LYSIMETERS DIVIDED INTO TWO GROUPS OF FIVE EACH WERE LOADED WITH RECONSTRUCTED SOIL PROFILES OBTAINED AT VARIOUS LOCATIONS IN CALIFORNIA. IRRIGATION OF GROUP 1 LYSIMETERS HAS BEEN TERMINATED DURING THIS REPORT PERIOD.

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DETERMINATION OF DECONTAMINATION CRITERIA

DIMP AND DCPD (U)

Report No. 1953-01(19)MP

Contract DAMD-17-75-C-5069

to

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Fredrick, Maryland 21701

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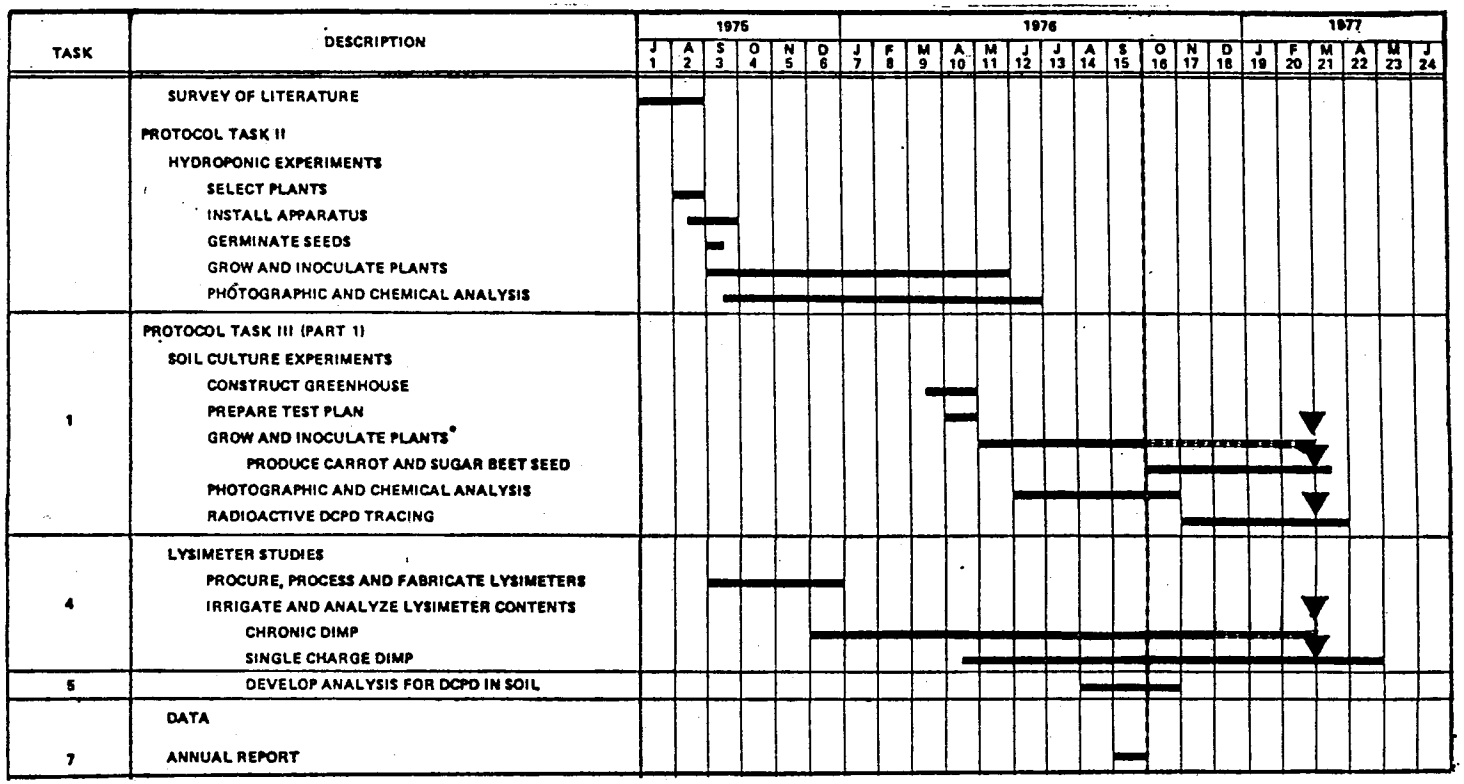

▼ - Satisfactory Progress - on schedule

Determination of Decontamination Criteria - DIMP and DCPD
Research Task Schedule

1953-01(19)MP

Progress on items proposed for action during February 1977, is discussed in this report.

Full Scale Lysimeter Tests

Ten lysimeters divided into two groups of five each were loaded with reconstructed soil profiles obtained at various locations in California. The five types of soil and their source locations are:

Chino	-	sandy clay loam
Brawley	-	silty clay
Ventura	-	clay loam
Fullerton	-	sandy loam
Walnut	-	clay loam

The soils were air dried, screened and packed into five foot deep epoxy coated steel cylinders and were fitted at various depths with a series of porous ceramic tensiometers to allow for sampling of the irrigation water as it percolates down through the soil. In the Group 1 lysimeters this biweekly irrigation consists of 12,887 ml. (2 inches of distilled water depth) with 20 ppm DIMP (diisopropyl methyl phosphonate) added. In Group 2 the top one foot of soil has had 20 ppm DIMP blended in and 12,887 ml. of distilled water added to each lysimeter generally on a biweekly basis.

A portion of the water/DIMP solution added to the lysimeters evaporates from the surface and another portion percolates down through the lysimeter and exits at the bottom, or 60 inch, level. As an indication of the relative amounts of water to terminate in these conditions the term "drainage ratio" has been used. This is the volume of water drained from the lysimeter

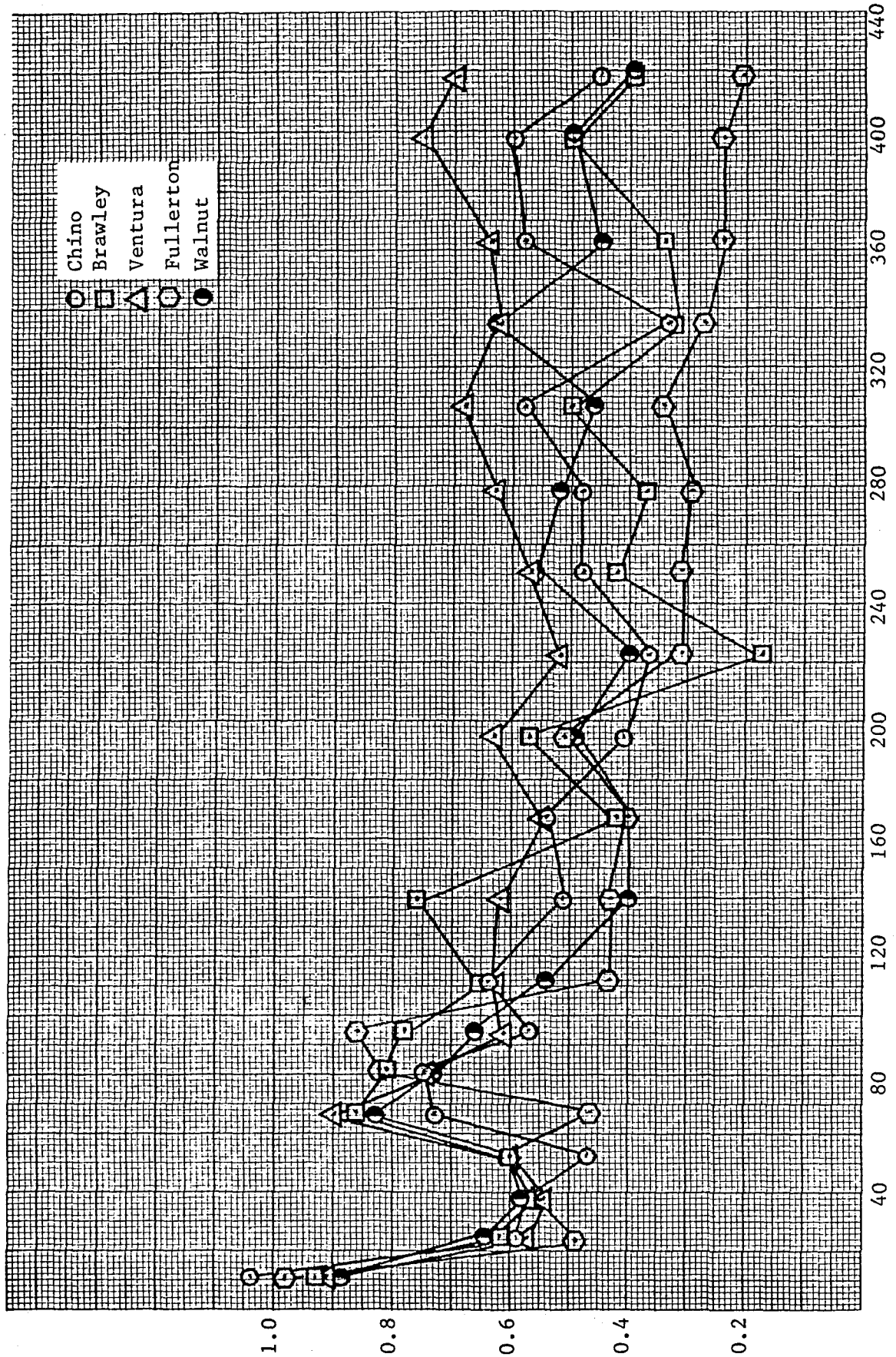

Figure 1. Drainage ratios of various soils in full scale lysimeter.
Group 1

divided by the volume of water applied to the surface. Figure 1 represents the drainage ratios from the Group 1 lysimeters for the 426 day treatment period. There is some evident scatter in the data caused by such things as meteorological variation but on the average the throughput was consistent. Table 1 shows the average drainage ratios for the five Group 1 lysimeters for the entire test period. These averages take into account thirty-seven sampling periods each.

Table 1

Average of Drainage Ratios After 426 Days

Group I

Soil Desig.	Soil Type	Avg.Drainage Ratio
Chino	Sandy Clay Loam	0.56
Brawley	Silty Clay	0.56
Ventura	Clay Loam	0.65
Fullerton	Sandy Loam	0.44
Walnut	Clay Loam	0.56

Mean = 0.55

These averages are arranged in a fairly normal distribution about their mean.

Irrigation of the Group 1 lysimeters has been terminated during this report period. Multiple soil core samples have been taken at horizontally disperse

points in the lysimeters and are being analyzed to determine and/or eliminate the random variation between core samples. Table 2 shows the data for the regular final single core samples from the Group 1 soils.

The DIMP content of the tensiometer water samples and the drain (60 inch depth) samples from Group 1 have shown that the DIMP in water has penetrated to the lysimeter drain and in all cases the several most recent samplings of the drain liquid approach or exceed the 20 ppm application concentration. The concentrations of the drain samples as a function of time are shown in Table 3 and illustrated in Figures 2a, 2b and 2c, in which the dotted line represents the applied concentration of 20 ppm. Further analysis of the water samples is underway.

The drainage ratios of the Group 2 samples have been followed also. Figure 3 shows these ratios to date. The average of these ratios, shown in Figure 4,appears to be somewhat lower than the average for Group 1.

The results of analyses of soil core samples from Group 2 are shown in Table 4. These values again are consistent with previous data indicating a slow moving band of DIMP passing through the lysimeter. Upon termination of the Group 2 tests multiple core samples will also be taken and material balances determined as in Group 1.

The tensiometer water samples from Group 2 have been analyzed and the results are shown in Table 5. The profiles are in general agreement with Group 2 data trends.

Table 2

DIMP Content of Soil Samples (ppm) (426 days)

Group 1

Depth	Ventura	Chino	Fullerton	Walnut	Brawley
0(surface)*	22.4	27.4	23.7	26.2	8.6
0 - 6"	3.1	7.4	3.9	6.2	5.9
6 - 12"	3.0	7.1	3.9	5.2	5.6
12 - 18"	1.5	6.1	3.1	3.8	6.4
18 - 24"	2.1	3.8	3.1	3.8	8.0
24 - 30"	2.6	6.4	3.3	5.1	6.8
30 - 36"	2.2	1.2	2.9	5.1	4.8
36 - 42"	2.3	1.7	2.0	4.1	5.2
42 - 48"	2.6	1.6	2.4	4.4	3.7
48 - 54"	2.3	2.0	3.4	4.2	4.2
54 - 60"	3.7	10.6	2.5	7.4	4.2

Table 3

DIMP Concentration in 60 inch Drain Samples

Group 1

Duration of Irrigation (days)	Soil Designation				
	Walnut	Fullerton	Ventura	Brawley	Chino
30	*	0.6	2.2	0.3	*
51	*	*	2.0	0.8	*
58	*	0.4	1.9	0.5	*
66	0.2	0.5	2.0	0.4	*
73	0.2	0.7	3.3	0.1	0.2
86	0.5	0.7	5.6	0.5	0.8
93	0.3	0.9	3.2	0.2	0.6
100	0.5	0.8	1.9	0.5	0.5
107	0.7	0.6	3.1	1.0	0.7
112	1.1	0.7	3.2	1.4	1.3
119	1.4	0.6	3.3	1.6	1.3
128	2.5	1.2	3.3	4.5	2.7
142	1.9	1.1	3.8	2.2	2.4
156	3.1	2.3	3.7	3.9	5.7
185	1.9	1.6	4.6	5.6	4.5
199	4.2	3.7	6.8	4.2	4.3
213	5.3	6.9	9.6	8.4	3.4
227	8.4	7.9	21.5	18.3	15.1
240	11.3	7.7	14.1	12.0	11.5
254	33.9	11.0	23.4	18.0	12.3
282	11.7	10.4	15.2	17.0	12.3
312	15.4	10.1	15.4	10.5	14.1
335	23.9	17.1	19.9	21.4	20.2
365	21.1	15.0	18.9	15.8	20.2
405	18.7	15.6	14.3	15.5	18.4
419	32.1	24.8	13.9	16.9	19.6

* Less than 0.1 ppm

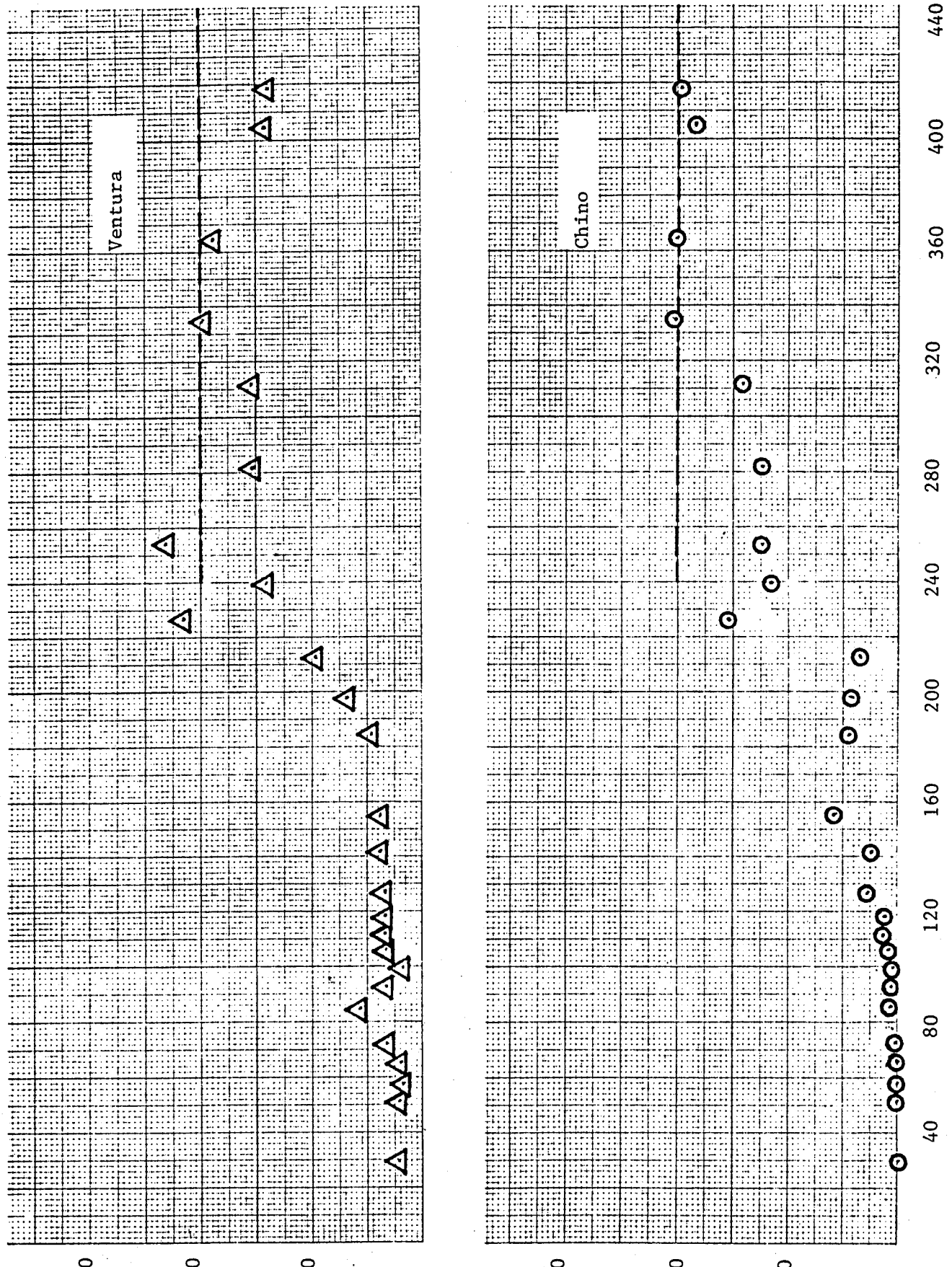

Figure 2a. Contration of DIMP in 60 inch sample of lysimeter water.

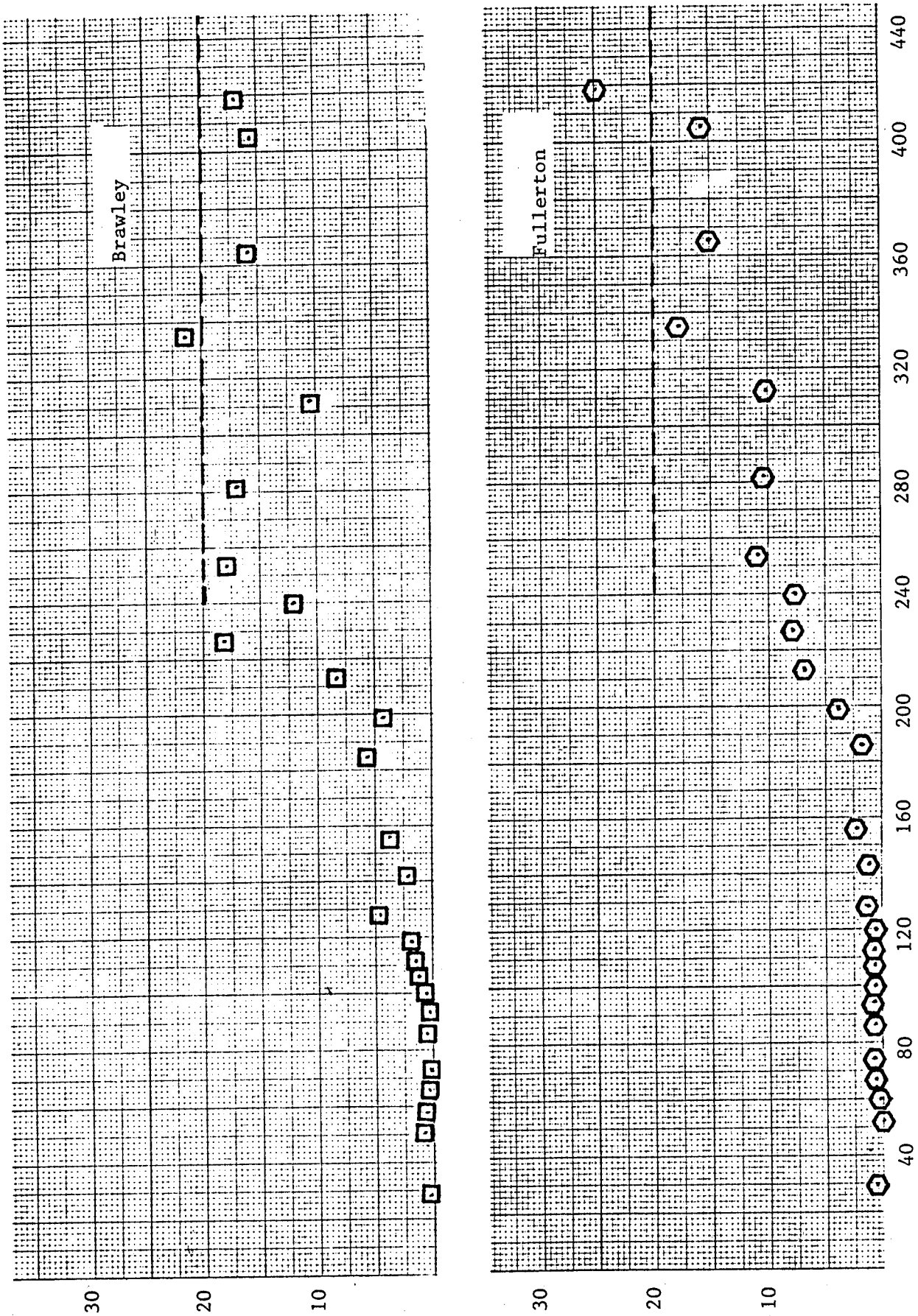

Figure 2b. Concentration of DIMP in 60 inch sample of lysimeter water.

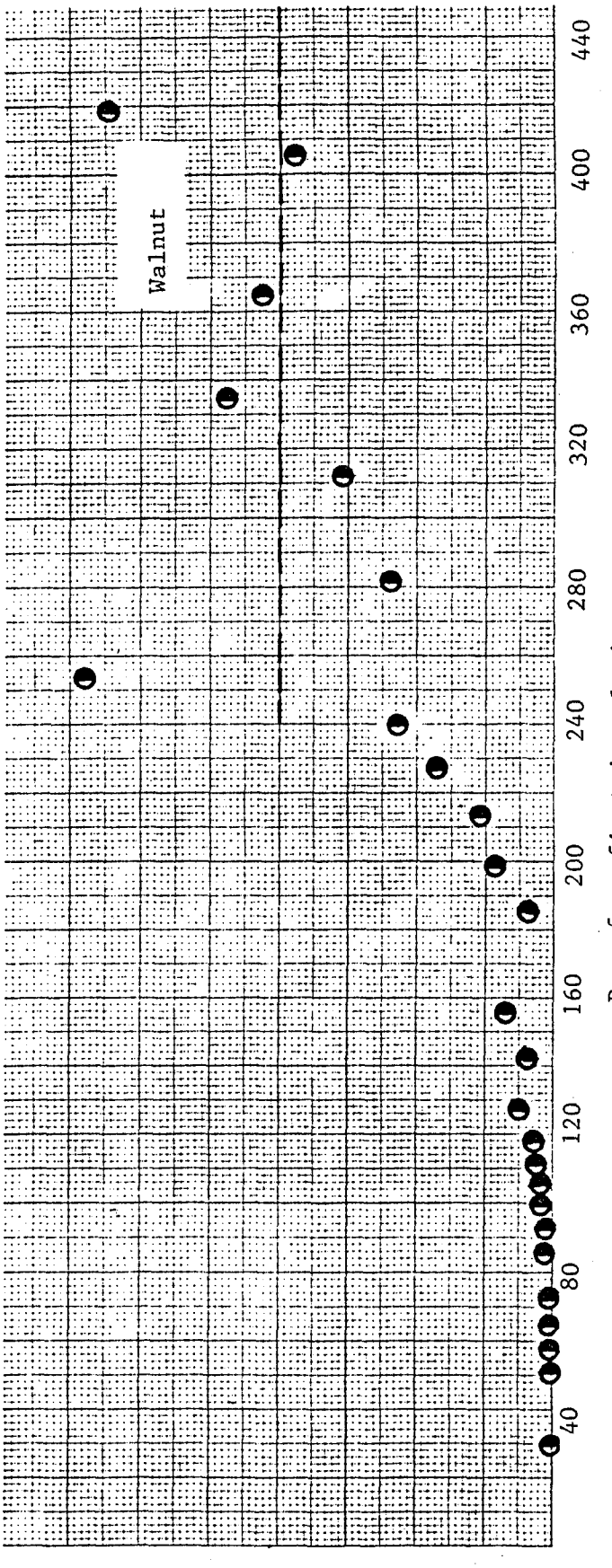

Figure 2c. Concentration of DIMP in 60 inch sample of lysimeter water.

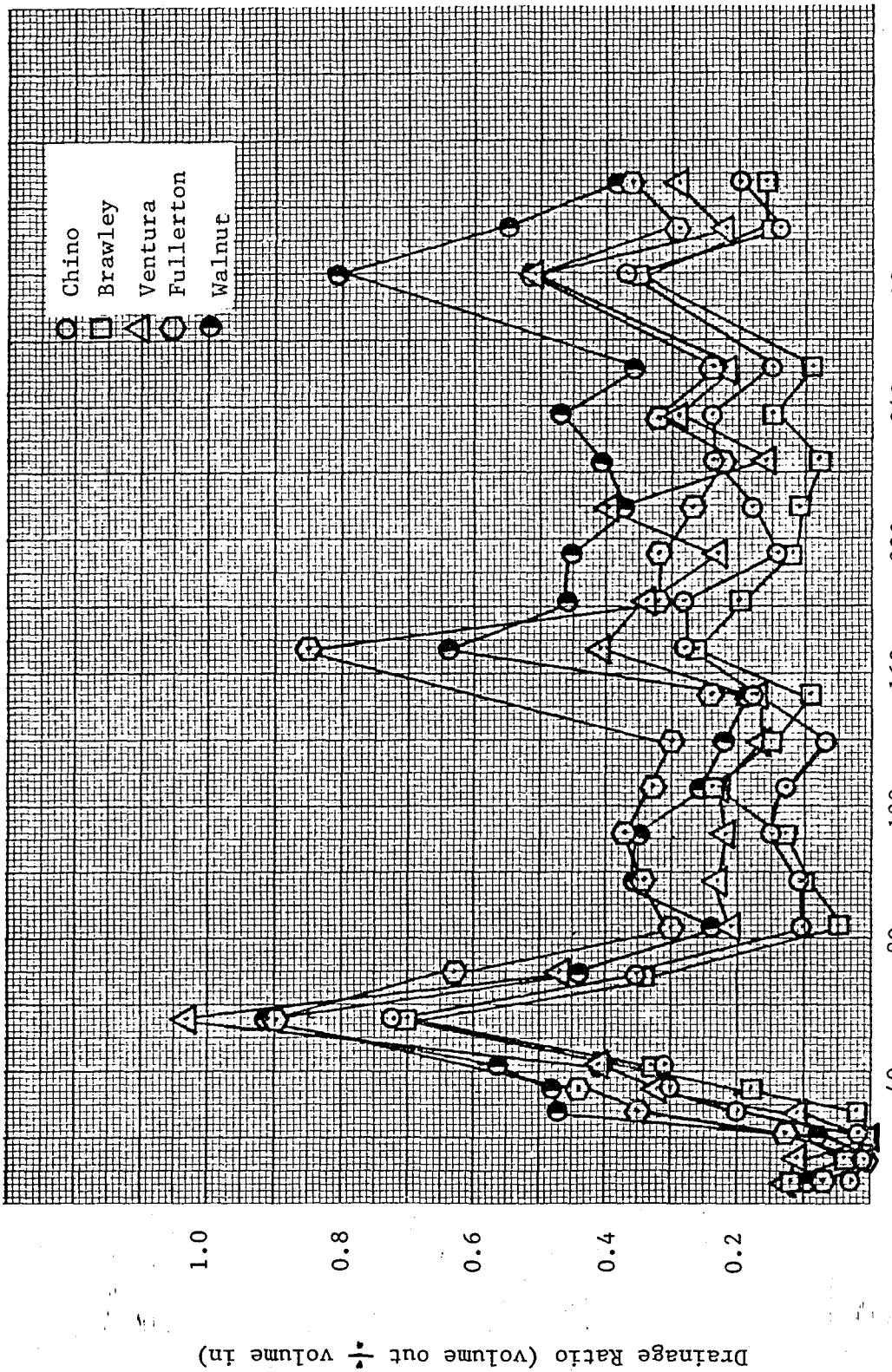

Figure 3 Drainage Ratios of Various Soils in Full Scale Lysimeters

Group 2

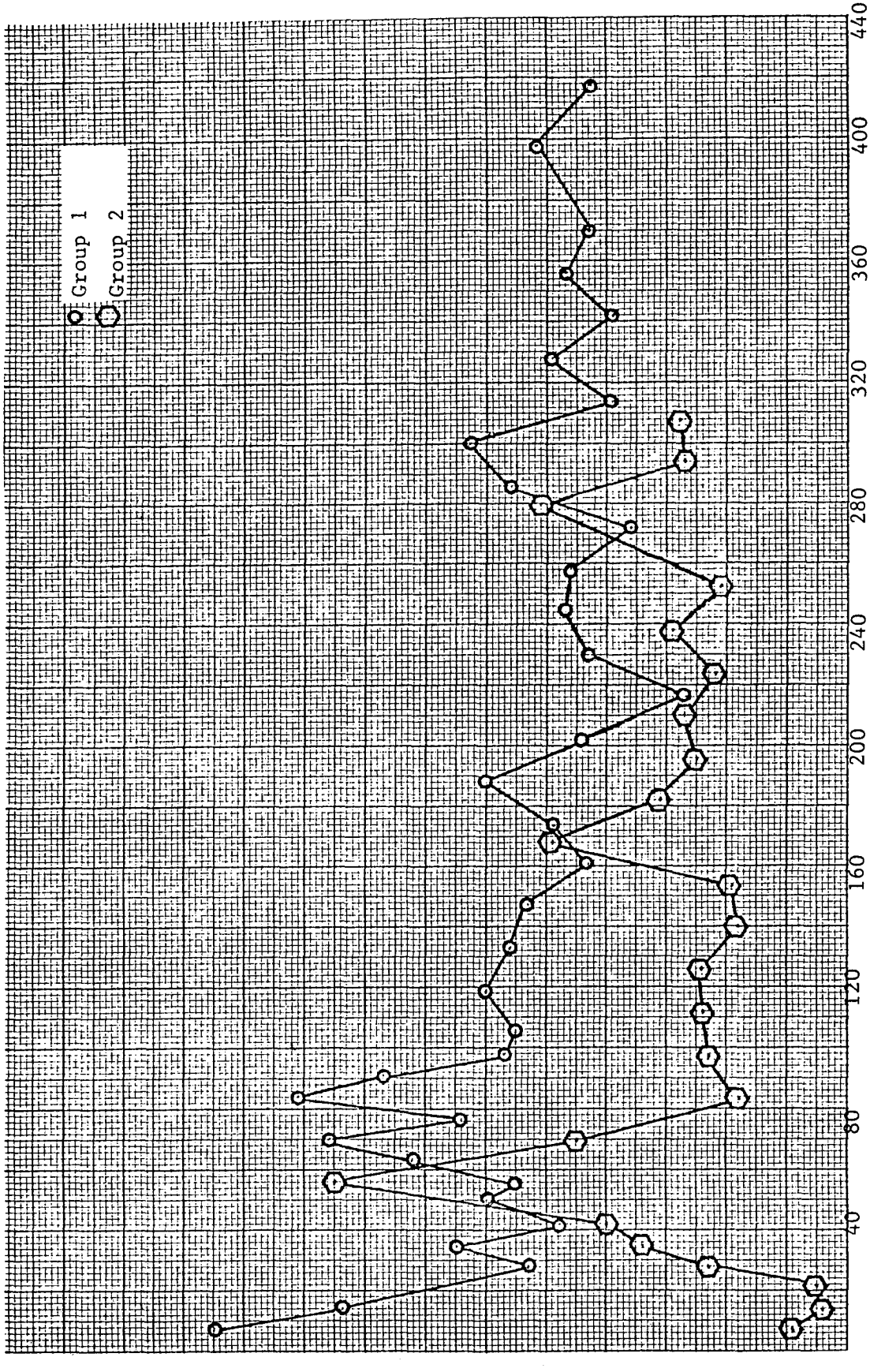

Figure 4 Drainage Ratios of Various Soils in Full Scale Lysimeters

Average of All Samples Within the Groups

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Table 4

DIMP Content of Soil Samples (ppm) (294 days)

Group 2

Depth	Ventura	Chino	Fullerton	Walnut	Brawley
0 (surface) *	*	*	*	0.4	*
0 - 6"	*	*	*	0.8	*
6 - 12"	*	*	*	1.1	*
12 - 18"	*	*	*	0.7	*
18 - 24"	*	*	*	0.8	*
24 - 30"	1.4	1.0	*	0.7	3.5
30 - 36"	5.1	5.3	*	0.6	9.5
36 - 42"	11.6	10.7	1.2	6.9	17.2
42 - 48"	10.3	15.1	2.8	2.2	13.0
48 - 54"	4.7	8.6	3.5	9.7	8.2
54 - 60"	3.0	4.9	6.6	7.3	2.3

* $\lessdot$ 0.1 ppm

Table 5

DIMP Content of Tensiometer Water Samples (ppm) (287 days)

Group 2

Depth	Ventura	Chino	Fullerton	Walnut	Brawley
6"	*	*	*	*	*
18"	*	13.2	*	*	5.1
30"	20.5	42.9	**	10.8	56.2
42"	54.5	32.5	24.4	30.1	18.3
54"	15.7	14.5	19.3	50.6	*
60"	*	*	*	30.7	*

* < 0.1 ppm.

** No sample